'Atiqot 97, 2019

Petrographic Analysis of Middle Bronze Age II Vessels from the Burial Pits in Ashqelon

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Introduction

Fifteen pottery vessels from Middle Bronze Age II burial pits at Ashqelon were chosen for petrographic analysis (see Gershuny, this volume).[1] This study aims at petrographically identifying the raw materials used for the pottery found in the excavations, describing their variability, determining the geological sources of their raw materials and assessing the possible geographic region of their manufacture. The choice was based on clay variations that were observed by the naked-eye, and the results make it possible to examine the site's connections with other areas and find answers to questions relating to cultural interactions. The interpretation of the petrographic results is based on geological and soil maps, as well as on geological and pedological literature and previous petrographic studies of pottery from various periods from Ashqelon (e.g., Dan, Marish and Saltzman 1975; Cohen-Weinberger 2004; Goren, Finkelstein and Na'aman 2004; Sneh and Rosensaft 2008; Stager, Master and Schloen 2011).

Geological Setting

The coastal site of Ashqelon is associated with Quaternary sand dunes and calcareous sandstone (*kurkar*), as well as alluvium soil of the Kurkar Group (Sneh and Rosensaft 2008). The calcareous sandstones are characterized by subangular to rounded quartz grains, cemented by calcite. Coralline algae, mollusks and foraminifera are also common in several units (Nir 1970:42–44; 1992). The area is also characterized by dark brown grumosolic soils and residual dark brown soils (Dan and Raz 1970; Rabikovitch 1970; Dan et al. 1975).

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[1] This paper was submitted in 1999; only minor updates were made in 2013.

RESULTS

The analyzed samples were found to belong to five petrographic groups (A–E).

Group A

A store jar (Fig. 1; 229/1, see Gershuny, this volume: Fig. 34:2), a miniature bottle (259/5; see Gershuny, this volume: Fig. 40:6), a burnished red-slipped dipper juglet (309/9; see Gershuny, this volume: Fig. 50:3) and probably another store jar (231/1; Fig. 2) belong to this petrographic group, which is characterized by calcareous, optically active, silty clay. The silt is relatively well-sorted and comprises about 10–15% of the paste. It contains quartz grains as its main component, together with other minerals, among them hornblende/oxyhornblende, minerals of the mica-group (muscovite, biotite), feldspar, minerals of the pyroxene group and ore minerals. The sand-sized non-plastic components (f:c ratio {0.062 mm} = ~90:10)[2] are rounded quartz grains and limestone. A single algae fragment appears in the store jar (231/1). This raw material was identified as aeolian loess soil, and the non-plastic components are derived from the coast's sediments (Goren, Finkelstein and Na'aman 2004:112). In the Ashqelon region, the loess soils are restricted to a limited number of sites (Dan, Marish and Saltzman 1975), yet are abundant about 16 km to the south–southeast of Ashqelon (Rabikovitch 1970). In previous petrographic studies of pottery, a set of aeolian

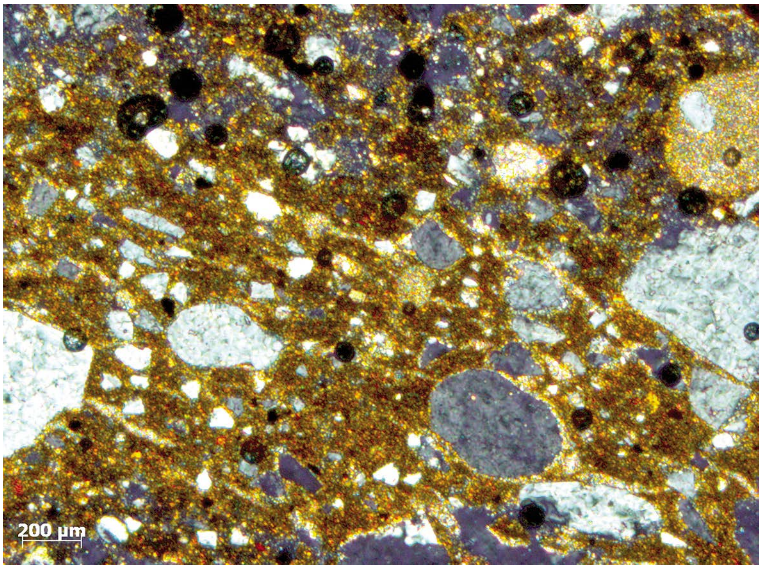

Fig. 1. Petrographic Group A: store jar (229/1), quartz grains embedded in calcareous silty matrix (× 50 xpl).

[2] The f:c ratio expresses the relative proportions of the fine (f) and coarse (c) components of a fabric. In this case, the boundary between these two components is 0.062 mm, which is the boundary between silt to sand size (Kemp 1985:22).

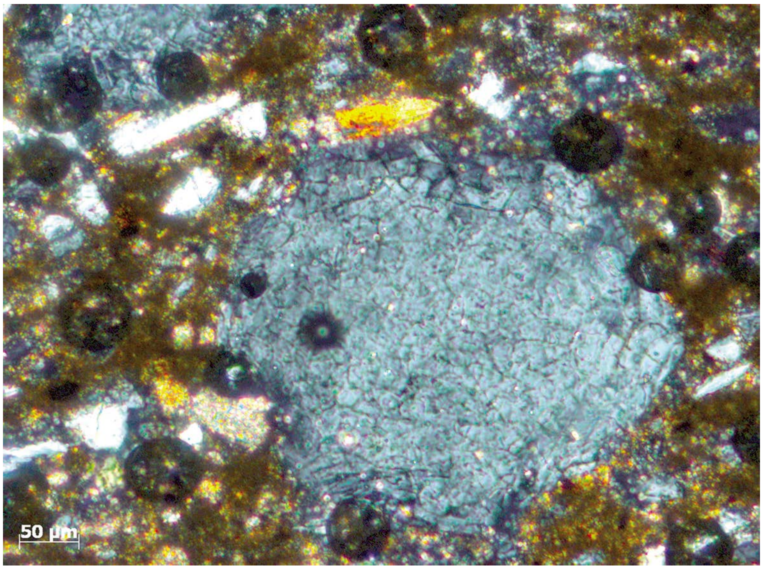

Fig. 2. Petrographic Group A: store jar (231/1), quartz grains embedded in calcareous silty matrix (× 100 xpl).

soils were generally included under the definition of loess since they are typified by similar high proportions of aeolian silt-sized quartz grains (10–20%) and abundant accessory minerals (Goren, Finkelstein and Na'aman 2004:112). Loess-derived soils are found near the site (Wieder and Gvirtzman 1999). These soils, such as the dark brown grumusol, are loessial soils from which the carbonates were to a large extent leached, and they also consist almost entirely of subangular to angular silt-sized quartz grains. It is noteworthy that loess soil was commonly used for the MB IIA vessels found in Phases 14 and 13 at Tel Ashqelon.[3] Therefore, the vessels related to this group might have been manufactured in Ashqelon from one of the local aeolian soils; however, other coastal Negev sites cannot be ruled out.

Group B

Two store jars (246/3—see Gershuny, this volume: Fig. 36:2; 260/2—see Gershuny, this volume: Fig. 41:4), three jugs (232/2—see Gershuny, this volume: Fig. 34:7; 316/3—see Gershuny, this volume: Fig. 52:5; 304/16—see Gershuny, this volume: Fig. 48:8), a single carinated bowl (Fig. 3; 310/8—see Gershuny, this volume: Fig. 51:2), one amphoriskos (Fig. 4; 258/3—see Gershuny, this volume: Fig. 39:4) and a single dipper juglet (300/9—see Gershuny, this volume: Fig. 46:4) belong to this petrographic group. The raw material of these vessels is characterized by non-calcareous clay and poorly sorted sand to silt-sized quartz grains. A significant amount of silt to fine, sand-sized heavy minerals are included,

[3] The Middle Bronze Age pottery from the Leon Levy expedition to Ashqelon underwent petrographic analysis by the author, yet unpublished.

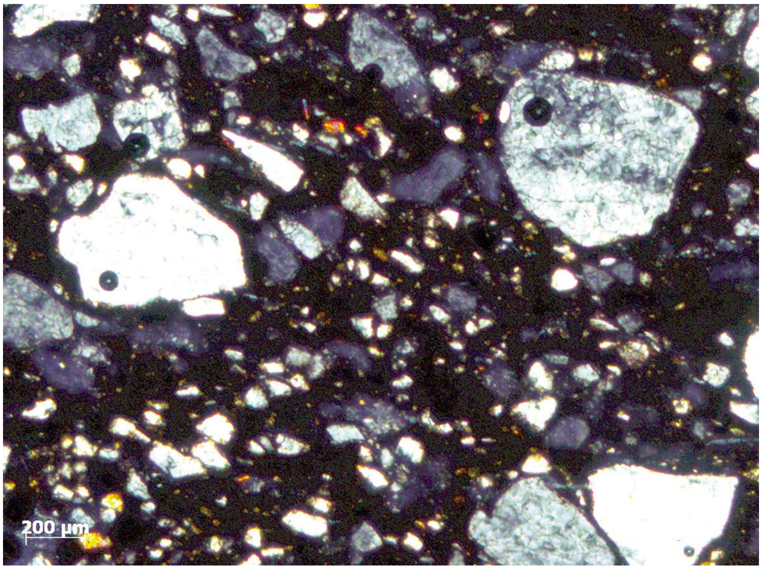

Fig. 3. Petrographic Group B: jug (304/16), sand-sized quartz and biotite grains are embedded in non-calcareous matrix (× 50 xpl).

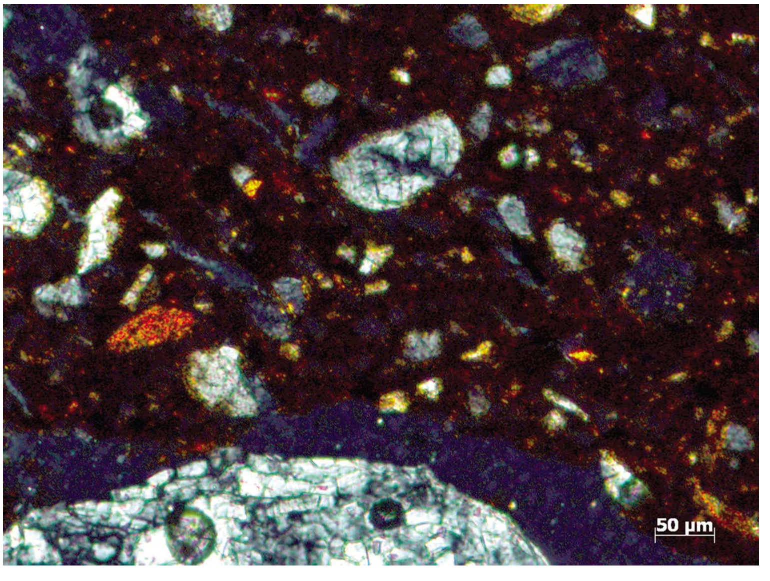

Fig. 4. Petrographic Group B: store jar (258/3), poorly sorted quartz grains embedded in a non-calcareous matrix (× 100 xpl).

such as mica and minerals of the amphiboles and pyroxene groups, as well as feldspar grains. The paste of one of the store jars (260/2) contains some amount of carbonatic particles. The source identification for these vessels is not certain as their mineralogical assemblage is similar to that of the local sandy soils, as well as to Nile Valley sediments

(Nordström and Bourriau 1993:158–165). The late Pleistocene, long-shore drifts carried out fine sediments in the upper water mass from the shelf off the Nile delta, past the southern part of the Levantine coast. These sediments filled bays along the shoreline as far north as Haifa (e.g., Emery and Neev 1960; Said 1990:21; Stanley and Galili 1996). The typical soil in the western part of the southern coastal plain is a quartzic dark brown soil derived of a sand parent material (Wieder and Gvirtzman 1999). The Nile is the source of the Ashqelon coastal sand and thus, the petrography of the Nile sediments is attested in the local sands and soils. A comparison of the vessels from Ashqelon versus Nile-made vessels shows that the pottery from Ashqelon is characterized by less heavy minerals, and other components typical to Nile-made vessels are entirely absent. However, the provenance identification of this petrographic group is challenging.

Group C

A single pithos (Fig. 5; 272/1—see Gershuny, this volume: Fig. 44:2) belongs to this group, and is characterized by a silty, non-calcareous, rather ferrugious clay, identified as soil. The non-plastic components comprise quartz grains, limestone and *kurkar*, suggesting a coastal origin. There is no definite identification of this soil, though the local brown soil is a likely source. This vessel was probably locally made, but production in other coastal sites cannot be excluded.

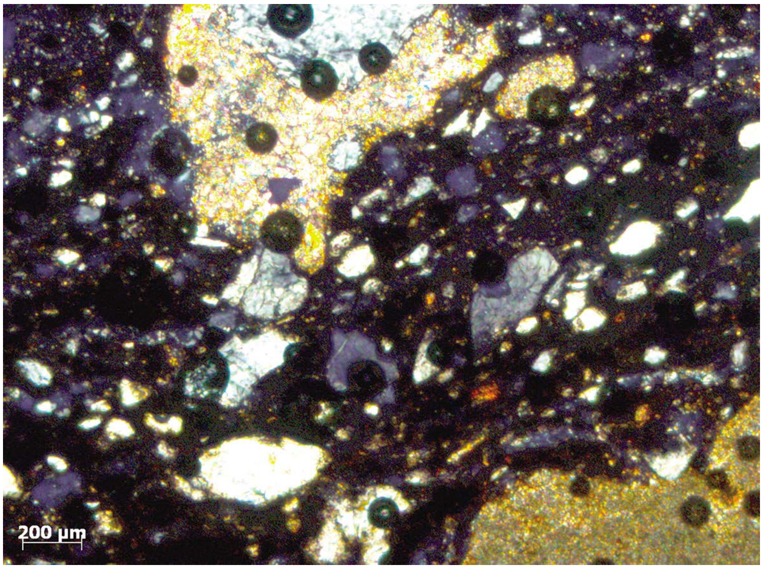

Fig. 5. Petrographic Group C: pithos (272/1), *kurkar* fragments and quartz grains are embedded in non-calcareous matrix (× 50 xpl).

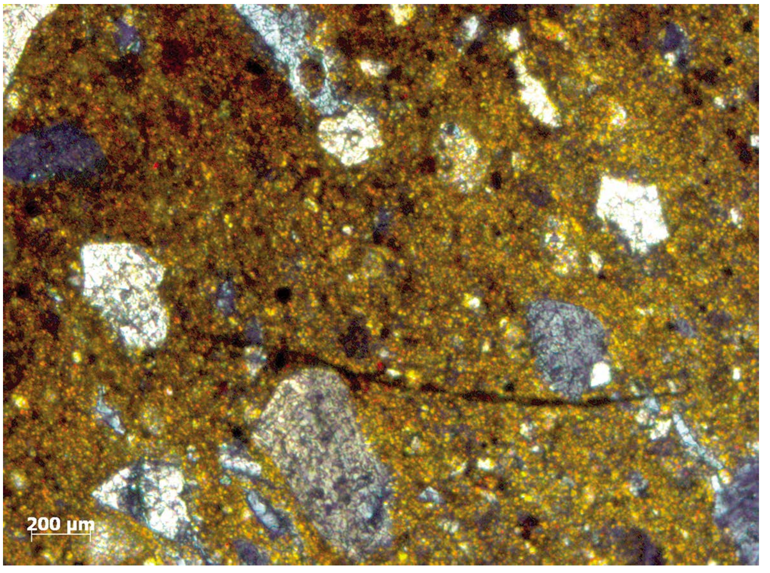

Fig. 6. Petrographic Group D: store jar (253/1), fine quartz grains embedded in calcareous matrix (× 50 xpl).

Group D

A single store jar (Fig. 6; 253/1) belongs to this group. This jar is defined by light, highly calcareous marl, which contains foraminifera and iron oxides. There are lumps of unmixed clay in the matrix. The non-plastic components consist of grog, which belongs to another petrographic group, identified as *loess* soil, rounded chalk, quartz, feldspar (microline) and *kurkar* fragments. The clay is identified as marl. The marl of the Palaeocene Taqiye Formation is a likely source, but an identification of the foraminifera should be undertaken for confirmation. The Taqiye Formation is exposed in the northern and central Negev and along the western slopes of the Judea-Samaria anticline (Bentor 1966:72–73). The wide distribution of this formation makes it difficult to define the source. The coastal components point to a source that is relatively close to the coast, thus the Taqiye Formation in the Shephelah region of Israel is a likely origin.

Group E

The Cypriot WP V amphora (Fig. 7; 300/5—see Gershuny, this volume: Fig. 47) is characterized by calcareous clay with some foraminifera. The clay is rich in minerals of the mica-group. The sand-sized non-plastic components consist of biotite, metamorphic quartz, plagioclase and eroded basalt. This mineralogical assemblage indicates that the provenance of this amphora is in the Troodos range or the southwestern coast of Cyprus.

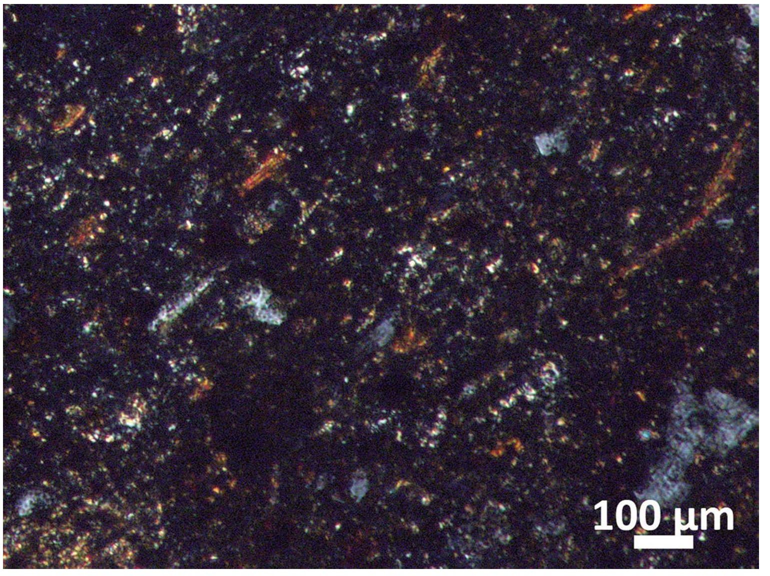

Fig. 7. Petrographic Group E: cypriot WP V amphora (300/5), matrix rich in mica laths (× 200 xpl).

DISCUSSION

The analyzed vessels show variability in raw materials. Based on a naked-eye examination of the assemblage, most of the vessels were made from various soils and coastal non-plastic components from the vicinity of the site. A single amphora originated in Cyprus.

The results suggest that vessels belonging to Group B were most likely made of local sandy soil, although a source in Egypt should be examined thoroughly and with caution. The first local production of Middle Bronze Canaanite shapes in Egypt started at the very end of MB IIA, as seen by provenance analyses in Strata G/1–3, Tell el-Dab‘a, and intensified during the transitional MB IIA–B period (Cohen-Weinberger 2008:127; Karin Kopetzky, pers. comm. 2013). The production of Canaanite pottery types in Egypt is known as early as Dynasty XII as inferred from a scene depicted in the tomb of Khnumhotep at Beni Hasan, where a man is seen forming pots; one of the pots has a handle and strongly resembles a Canaanite dipper juglet (Newberry 1893: Pl. 29; Arnold and Bourriau 1993:48, Fig. 52A). In general, locally made Canaanite shapes are found in a limited number of sites, including Tell el-Dab‘a. All the shapes from Ashqelon that petrographically belong to Group B, apart from Jugs 304/16 and 316/3, were found in Tell el-Dab‘a and were made with local Nile fabrics (Karin Kopetzky, pers. comm. 2013). However, export of vessels from Egypt to Canaan increased and became more intense during MB II (e.g., Cohen-Weinberger 2008). In conclusion, the possibility that the vessels of Group B or some of them may have been imported from Egypt cannot be ruled out. Only further studies that include comparisons to relevant vessels from Egypt will assist in answering this question.

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